

## Chapter 2 - Review on 'Procurement and Utilization of Track Machines in Indian Railways'

### Executive Summary

*Indian Railways operate 7000 Passenger trains and 4000 Goods trains per day over 103642 KM of Broad Gauge (BG) track. Increase in number of trains and saturated line capacity has posed a challenge to Indian Railways to maintain the track fit and safe within the limited maintenance blocks. Moreover, technology advancement of track structure has necessitated switching over from manual maintenance to mechanised maintenance. Track machines of various types are being used for performing activities such as tamping of track (packing of ballast below sleepers) and cleaning of ballast, stabilising of track, laying and handling of rails/sleepers/points and crossings etc. Maintenance of track was being carried out by 743 track machines available with the Indian Railways as of March 2014.*

*A review on "Procurement, Utilisation and Maintenance of track Machines over Indian Railways" was taken up in 2003-04 and the audit findings were included in Comptroller & Auditor General of India's Audit Report No. 9 of 2004. In their Action Taken Note, Railway Board inter-alia stated that close monitoring was being done for procurement of track machines, getting more blocks and putting extra efforts to reduce the down time of machine by doing the regular maintenance schedules. It was also stated that monitoring was also done for reduced expenditure on consumption of HSD oil and stores. The present review was undertaken to see the extent of compliance and the effectiveness of the action taken by the Ministry of Railways.*

*Audit observed that the projection of requirement of track machines in the Master Plan 2010-20 lacked accuracy as it did not take into account the trend of actual growth of track and adoption of tamping cycle as provided in the manual of Indian Railways or based on Track Geometry Index (TGI) criteria. Track machines are mostly imported. No time bound action plan had been drawn up for development of indigenous capabilities in respect of track machines in the Master Plan as visualised in vision 2010-2020 document.*

*Major Audit findings of the Review are:*

- *Procurement process had not been initiated for 171 machines. While the process was deferred for 58 machines due to non-finalisation of technical specifications and for 98 machines due to paucity of funds, the process was not initiated for 15 machines. There was also undue delay ranging from five months to 42 months in initiating the procurement process of 153 machines besides delay in finalization of tenders by Railway Board.*

*Para 2.6.3*

- *Despite having knowledge of poor after sales service, the decision of Railway Board to accept the offer of a firm for procurement of 13 nos of work site tampers valued at ₹ 67.56 crore was injudicious. There were frequent break down of machines resulting in considerable loss of machine days (764 days) apart from delay in commissioning ranging from 94 days to 257 days beyond*

*the stipulated period of 90 days. In yet another case, two numbers of Ballast Regulating Machines were procured at a cost of US \$ 2220467 from the same firm. While one machine was not commissioned till March 2014, the other machine was idle for 408 days due to frequent failures.*

*Para 2.6.3*

- *Incorrect assessment of work load in the Zonal Railways led to excess procurement of 43 tamping machines (30 nos of plain track tamping machines, 13 numbers of points and crossing tamping machines) and 27 Dynamic Track Stabilising (DTS) machines and short procurement of 91 machines (39 BCM, 18 SBCM and 34 T-28 machines) in addition to injudicious distribution of machines among Zonal Railways.*

*Para 2.6.4*

- *Targets fixed by Railway Board for working of track machines were not as per actual requirements of Zonal Railways. Audit noticed that target was fixed either in excess or less than the requirement. This resulted in carrying out the works beyond requirement or non-achievement of complete mechanization by the Zonal Railways.*

*Para 2.6.4.1*

- *Non adoption of Track Geometry Index (TGI) criteria for assessing tamping requirements had not only resulted in extra expenditure due to excess tamping but also in excess utilization of scarce maintenance blocks.*

*Para 2.6.5.1*

- *The works such as deep screening of ballast, track laying and turnout renewal works had to be done manually due to shortage of machines.*

*Para 2.6.5.2 (B)*

- *Idling of the track machines was mainly due to failure of TMO in demanding full stipulated block hours, granting of less block hours by the Operating department, delay in commissioning of machines, programme not planned, no scope of work etc.*

*Para 2.6.5.2(C)*

- *14 track machines were condemned prematurely due to frequent breakdown, non-availability of spares, inferior quality of output etc. Delay in condemnation of 33 numbers of over-aged machines (ranged between 7 months and 240 months), non-disposal of 18 condemned track machines (ranging from 7 months to 323 months) had resulted in avoidable payment of dividend to General Revenues*

*Para 2.6.5.3*

- *Shortage of staff for operating and maintenance of machines led to idling of machines. Shortfall ranged between 32.71 per cent and 69.15 per cent in respect of SSE/JE, 11.19 per cent and 63.57 per cent for TMM and 3.20 and 66.01 per cent for Helper. Shortfall in deputing machine operators to undergo refresher courses ranging from 6 per cent to 86 per cent was also noticed.*

*Para 2.6.6 and 2.6.6.2*

- *Variation in the quantum of work done by machines uploaded in Track Management System (TMS) with the quantum reported to Railway Board by TMO defeated the very objective of TMS as TMS is considered as a tool in making managerial decisions.*

*Para 2.6.7.1*

- *Excess consumption of HSD Oil per unit of working by same machines in two consecutive years in the same zone (ranged from 15 per cent to 2379 per cent for 264 machines) and by similar machines across the Zones in the same period (ranged from 25 per cent to 293 per cent for 60 machines) even after allowing a reasonable allowance of 15 per cent and 25 per cent respectively for site conditions, showed lack of internal control mechanism.*

*Para 2.6.7.2*

## 2.1 Introduction

Indian Railways operate about 7000 Passenger trains and 4000 Goods trains per day over 103642 KM of total BG track<sup>22</sup>. Phenomenal spurt in traffic and continuing rail accidents have put greater onus on Railways for maintaining safe and fit tracks. The track structure has become sturdier and less amenable for manual maintenance due to continuous developments in various track components namely rails, sleepers, fastenings, points and crossings etc. This led to gradual proliferation of use of track machines for mechanized maintenance of track. Over the years, extent of mechanized maintenance gained importance for reliable track maintenance with high degree of precision and quality with lesser dependence on human factor.

Indian Railways identified 77922 BG track kilometres<sup>23</sup> (75 per cent) as on 31 March 2014 for mechanized maintenance with the help of 743 track machines<sup>24</sup>. The maintenance of balance 25720 track kilometre having sleepers other than pre-stressed concrete sleepers, portion of track laid on steel girder bridges and yards (Loop lines and sidings) were being done manually. Track machines of various types are being used for performing activities such as tamping of track (packing of ballast below sleepers), cleaning of ballast, stabilization of track, laying and handling of rails/sleepers/Points and crossings etc. Details of functions of different types of track machines are mentioned in *Appendix- A*

A review on Procurement, Utilization and Maintenance of track Machines over Indian Railways was taken up in 2003-04 and the audit findings were included in Comptroller & Auditor General of India's Audit Report No. 9 of 2004. The Report inter-alia highlighted the deficiencies such as procurement of excess track machines, availability of lesser effective Block Hours for track machine working,

<sup>22</sup> *Indian Railway Track Statistics as on 01-04-2014 (NWR-6177,SCR-9202,WR-7702,CR-8098,NER-3199,NFR-4196,SER-6024,SWR-4505,SR-7732,SECR-4177,NR-11412,WCR-6178,ECR-7239,NCR-5612,ECOR-5263 and ER-6928.)*

<sup>23</sup> *Indian Railway Track Statistics as on 01-04-2014 (NWR-4831,SCR-7785,WR-5887,CR-5862,NER-2687,NFR-3188,SER-4085,SWR-3803,SR-6297,SECR-2881,NR-8484,WCR-4740,ECR-4998,NCR-4412,ECOR-3773 and ER-4209.)*

<sup>24</sup> *CR-51,ECR-54,ECOR-30,ER-46,NCR-57,NER-23,NFR-30,NR-70,NWR-32,SCR-75,SECR-34,SER-49,SR-53,SWR-30,WCR-50,WR-59*

avoidable expenditure on early tamping of tracks with reference to the requirement, non observance of stipulated maintenance schedules for the track machines etc.

In their Action Taken Note, Railway Board stated (January 2011) that close monitoring was being done for procurement of track machines, getting more blocks and putting extra efforts to reduce the down time of machine by doing regular maintenance schedules, inspection schedules, so that the machine is maintained in good health. It was also stated that monitoring was also done for reduced expenditure on consumption of HSD oil and stores. The present review was undertaken to see the extent of compliance to the assurance and the effectiveness of the action taken by the Ministry of Railways.

## 2.2 Organizational structure

At Railway Board level, the Track Machine Directorate is under the control of Civil Engineering Directorate headed by Member Engineering followed by Additional Member (Civil Engineering) He is assisted by Executive Director (Track Machines) and Director (Track Machines).

At the Zonal level, the Track Machine Organisation (TMO) is headed by the Principal Chief Engineer (PCE) who is assisted by the Chief Engineer (Track Machines), Deputy Chief Engineer (Machines) and Executive Engineer (Machines).

At the field level, Deputy Chief Engineer, Executive/ Assistant Engineers and Senior Section Engineers at the Base Depots take care of day to day operations, repair and maintenance of the track machines.

## 2.3 Audit objectives

Main objectives of the review were to examine:

- I. The existence of a proper long term plan based on assessment of the requirements of track machines to ensure continuous availability for mechanized maintenance of track.
- II. The adequacy of procurement plan and timely procurement of track machines.
- III. The efficiency in distribution, utilization and maintenance of track machines.
- IV. That a proper system was in place for assessing the requirement of manpower and its effective deployment ensuring continued operations.
- V. The effectiveness of Management Information System adopted by Track Machine Organization and other issues related consumption of fuel, accounting procedures, etc.

## 2.4 Audit criteria

The criteria for assessing the performance of Indian Railways in procurement and utilization of track machines were derived from the following sources:

- (i) Requirements projected in the Master Plan derived from Vision 2010- 2020 document.
- (ii) Railway Board's policy and action plan for indigenous development of capability in respect of track machines.
- (iii) Rolling stock programmes (RSP) and Railway Board policy with regard to procurement of track machines.
- (iv) Indian Railway Track Machine Manual.
- (v) Railway Board's guidelines/instruction and also instructions by the Zonal Railways issued from time to time in respect of deployment, idling and condemnation of track machines etc.

### 2.5 Audit scope and methodology

The Review covered examination of records (macro level) relating to assessment, procurement and utilization of track machines, fixation of targets for working of the machines and other miscellaneous issues related to mechanized track maintenance. The study covered a period of five years from 2009-10 to 2013-14. For micro level study the following were examined:

- i. Operations and maintenance of all the track machines during the period of five years from 2009-10 to 2013-14
- ii. Analysis of tamping charts for the years 2012-13 and 2013-14.
- iii. Comparison of assessment, quantum of work done during 2013-14 and reported by Track Machine Organization with that uploaded in Track Management System (TMS).

Audit Methodology included examination of records at Railway Board, Zonal Headquarters, Track Machine Organisation, Divisions and Track Machine Depots together with analysis of relevant data.

### 2.6 Audit findings

**Objective I: Existence of a proper long term plan based on assessment of the requirements of track machines to ensure continuous availability for mechanised maintenance of track.**

#### 2.6.1 Projection of track machine requirements

As per Master Plan (2003-10) for procurement of track machines, 445 machines were procured during the period from 2003-10 as against the requirement of 609 machines projected in the Master Plan. Though the requirement of track machines was reviewed annually at the time of finalisation of Rolling Stock Programme, a comprehensive mid-term review of the Master Plan was not done until 2009-10 when another Master Plan was prepared for the year 2010-20 in tandem with the planning and growth forecasts envisaged in Vision 2020 documents for Indian Railways. The projected requirement of track machines as on 01 April 2020 including the ones on replacement account were estimated at 396 machines<sup>25</sup>. The

<sup>25</sup> CSMs-130, Unimats-76, BCMs-126 and SBCMs-64



requirement of track machines was worked on the criteria that the mainline track kilometre would increase by 72 *per cent*<sup>26</sup> by 2020 (*average annual increase of 6.54 per cent for 11 years*) and Tamping cycle<sup>27</sup> would be 12 months on A and B routes<sup>28</sup> and 18 months on other routes<sup>29</sup>.

Scrutiny of records revealed that:

- i. the actual growth of track kilometre during 2001-02 to 2007-08 as mentioned in the Master Plan was only 8.71 *per cent* with an average annual increase of 1.2 *per cent* and;
- ii. the tamping cycle adopted in the Master plan was not as per the cycle prescribed in IRTMM<sup>30</sup> which is two years or 100 Gross Million Tonnes (GMT) of passage of traffic, whichever is earlier for all types of routes.
- iii. Taking into account the actual growth of track kilometre ( 13.2 *per cent* for 11 years up to 2020 at the rate of 1.2 per cent per annum) and as per tamping cycle prescribed in IRTMM, audit worked out the requirement of 174 machines<sup>31</sup> as on 01 April 2020 as against the projection of 396 machines as indicated in the table below:



Duomatic Tamping Machine

**Table 2.1: Requirement of track machines as projected in the Master Plan and as assessed in Audit**

Description of Track Machines	Projection of the requirement in the Master Plan (as on 01 April 2020)	Projection of the requirement as worked out by Audit (as on 01 April 2020)
CSMs	130	45
UNIMATs	76	21
BCMs	126	67
SBCMs	64	41
<b>Total</b>	<b>396</b>	<b>174</b>

<sup>26</sup> 123644 kms as on 01 April 2020 as against 71744 track kms as on 01 April 2009

<sup>27</sup> Tamping Cycle: Period between two tampings

<sup>28</sup> A & B routes: Group A route: Speeds up to 160 kmph, Group B route: Speeds up to 130 kmph (Para 202 of Indian Railway permanent way manual)

<sup>29</sup> Other routes: Group C: Suburban sections, Group D: Sanctioned speed of 100 kmph, Group E: Speeds less than 100 kmph (Para 202 of Indian Railway permanent way manual)

<sup>30</sup> Para 5.7.4 (VI) of the Indian Railway Track Machine Manual

<sup>31</sup> Audit assessment included machines on replacement account and the number of different types of machines were CSMs-45, Unimats-21, BCMs-67 and SBCMs-41.

When Audit pointed out (July 2014) the issue of excess estimation in the Master Plan, Railway Board stated (December 2014) that the actual growth in track kilometre during 2009-14 was 7568 km. (average annual growth of 2.11 per cent) and the periodicity of tamping cycle as adopted in the Master Plan was based on field experience. Railway Board also stated that the sidings and yard lines were not included in the track km. while calculating requirements of track machines in the Master Plan though machines are required for these lines as well in actual practice.

Contention of Railway Board was not tenable on the following grounds:

- i. In January 2008, Railway Board directed all the Zonal Railways to assess tamping requirements as per Track geometry index (TGI)<sup>32</sup> criteria. In a study conducted by NCR, it was observed that tamping requirements came down by 30 per cent based on TGI criteria and tamping cycle as prescribed in IRTMM.
- ii. 75.18 per cent of total track km. was nominated for machine maintenance which included sidings and yard lines. Thus, it was evident that siding and yard lines were being maintained manually in practice.
- iii. Based on the actual growth of track during 2009-14 (10.55 per cent with an average annual increase of 2.11 per cent) and adopting the tamping requirements based on TGI criteria, it was noticed that 217 numbers of track machines were assessed in excess in the Master Plan as indicated in the table below:

**Table 2.2: Requirement of machines based on Track Geometric Index**

Description of Track Machine	Projection of the requirement in the Master Plan (as on 01 April 2020)	Projection of the requirement as worked out by Audit (as on 01 April 2020)
CSMs	130	31
UNIMATs	76	26
BCMs	126	77
SBCMs	64	45
Total	396	179

Thus, Railway Board failed to ensure compliance with its directives of assessing the requirement of track machines based on TGI and tamping cycle as prescribed in its manual. The estimation of requirement of track machines in the Master Plan was not based on correct assumptions resulting in higher estimation of requirement of machines.

### 2.6.2 Planning for development of indigenous capabilities

Vision 2010-2020 document of Indian Railways visualized transformation of Indian Railways as a technology exporter from technology importer, duly fostering a close linkage between Research, Design & Standards Organisation (RDSO), functional levels of Railway Administration and intellectual resources at premier technology institutes like Indian Institute of Technology (IITs), National Institute

<sup>32</sup> TGI (Track Geometry Index): To avoid frequent tamping of good quality track, RDSO had recommended guidelines based on TGI Values which had been approved by Railway Board.

of Technology (NITs), research laboratories of Council of Scientific & Industrial Research (CSIR), Defence Research & Development Organisation (DRDO) along with targeted investments in Research and Development.

Scrutiny of records, however, revealed that there was no planning or time bound action plan for development of indigenous capabilities in respect of track machines as envisaged in Vision 2010-2020 document. Railway Board stated (December 2014) that the level of indigenisation of up to 100 *per cent* had been achieved in case of less complicated simpler machines<sup>33</sup>, up to 30-50 *per cent* in case of machines having intermediate complexity and up to 20 *per cent* in case of highly complex machines. In this connection, it is pertinent to mention that while smaller track machines such as track relaying equipments, utility vehicles, Rail Borne Maintenance Vehicles, light tampers etc. are fully indigenized the percentage of indigenization of components in other machines<sup>34</sup> where developmental order was placed on Indian companies ranged from 36 to 47 *per cent*. Larger track machines<sup>35</sup> are still fully imported.

**Objective II: To see the adequacy of procurement plan and timely procurement of track machines**

**2.6.3 Procurement Process**

The proposals for inclusion of procurement of track machines in Rolling Stock Programme<sup>36</sup> (RSP) are prepared at the Railway Board based on requirement assessed in the approved Master Plan 2010-20 by the Track Directorate (Machines) of Railway Board and submitted to Finance Directorate of Railway Board. After examining the proposal, Finance Directorate communicates concurrence. Thereafter, the proposal is submitted to Minister for Railways (MR) through Member Engineering (ME) and Chairman Railway Board (CRB) for sanction. After obtaining sanction of MR, the proposals are included in the RSP of Railway Board.

Based on RSP, Global Tenders are invited for procurement of track machines. The offers received are evaluated technically and financially by the Tender Committee comprising of Executive Directors of Finance, Stores and Track Directorate

<sup>33</sup> *smaller Track Machines such as track relaying equipments, equipment for handling and relaying concrete sleepers, Portal cranes, utility vehicles, Rail borne maintenance vehicles, soil disposal units, light tampers,*

<sup>34</sup> *Dynamic Track Stabilizers, Works Site Tampers, High Output Tampers, Points and Crossings Tamping Machines.*

<sup>35</sup> *Ballast Cleaning machines, Shoulder Ballast Cleaning machines, Ballast Regulating machines, Tamping express, Unimats, Track Relaying Trains, Rail Grinding machines, T- 28s, etc*

<sup>36</sup> *Rolling Stock Programme: It is the programme for procurement of Rolling stock proposed by Indian Railways.*



(Machines). The recommendations of Tender Committee are accepted by the competent authority<sup>37</sup> and contract is entered into for the supply.

A review of the proposals included in RSP and tenders invited during 2009-14 revealed the following:

- i. As against procurement of 638 numbers of track machines costing ₹5963.55 crore proposed to be procured by the Track Directorate (Machines), procurement of 324 machines (costing ₹2569.22 crore) was concurred to by Finance Directorate and sanctioned by the Competent Authority for inclusion in the RSPs of respective years of the review period. Paucity of funds, shortfall in growth of track kms as anticipated in Master Plan 2010-20 and slow procurement process of track machines included in earlier year's RSPs were cited as the reasons for curtailment of the requirement by Finance Directorate:

**Table-2.3: Year-wise proposal and sanction of track machines**

Year	No. of machines proposed by Track Directorate (Machines)		No. of machines concurred by finance, sanctioned to be included in RSP		Reasons for curtailment
	Nos.	Amount in crore	Nos.	Amount in crore	
2009-10	91	1066.66	72	410.50	Paucity of Funds
2010-11	195	1291.8	137	851.04	
2011-12	223	1779.02	83	984.33	Constraint of funds
2012-13	43	546.02	3	60.42	Procurement process was very low during 2011-12
2013-14	86	1280.05	29	262.93	Shortfall in growth of track km. as anticipated in the Master Plan
<b>Total</b>	<b>638</b>	<b>5963.55</b>	<b>324</b>	<b>2569.22</b>	

- ii Out of 324 track machines included in the RSP during 2009-14, tenders had not been called for in respect of 171<sup>38</sup> machines costing ₹1180.99 crore (March 2014). While invitation of tender for 98 machines was deferred due to paucity of funds, the process of invitation of tenders for 58 machines was

<sup>37</sup> *Competent Authority: Tender value over ₹25 crore and up to ₹50 crore (Additional Member); over ₹50 crore and up to ₹75 crore (Member); over ₹75 crore and up to ₹100 crore [MOS (R)]; over ₹100 crore (MR)*

<sup>38</sup> *2009-10; 13Nos, 2010-11; 96 Nos; 2011-12; 35 Nos, 2012-13; 3Nos & 2013-14; 24 Nos.*

deferred due to non finalization of technical specifications. Tendering process in respect of balance 15 machines was not initiated (March 2014).

- iii In respect of 153 machines where tenders had been called, delay in calling of tenders ranged between 5 months and 42 months after allowing the reasonable time of three months from 01 April of respective years of the review period since RSPs for the ensuing years were finalised by 31 March of each year.

Railway Board in their reply (December 2014) stated that as track machines have long procurement cycle of 4 to 5 years, inclusion in the RSPs and procurement was phased out in accordance with funds availability. Contention of Railway Board was not tenable as non initiation of procurement process due to paucity of funds was not justified especially since the curtailment of numbers of machines was already done in RSPs due to the same reason. Further, deferring the procurement process of track machines included in the rolling stock programmes due to non finalisation of the technical specifications was itself indicative of poor planning.

- ii. Railway Board, as a policy, has stipulated eight months as the standard time for finalising tenders from the date of calling. It was observed that in respect of five tenders for procuring 46 machines<sup>39</sup> valuing ₹ 442.04 crore, delay in finalisation of tenders ranged between one month and six months.
- iii. Lack of efficient management of contract resulted in delay in commissioning of machines and idling of machines due to frequent breakdown of newly imported track machines as discussed below:

- (i) As per Item No. 1061 of Rolling Stock Plan 2010-11 (carried forward from RSP of 2009-10), an open tender which was invited (vide Tender Notice No. 0101 of 2009 dated 20/10/2009) for supply of 13 numbers of Work site Tampers, was opened (23/12/2009) and finalized in favour of a Russian firm<sup>40</sup> at a total value of US \$ 9271980.96.

During technical evaluation of the firm, Track Directorate expressed on record the principal concern about the firm regarding poor after sales support in terms of availability of spares and competent service. Despite such disadvantages, the offer of the firm was considered technically suitable. It was observed that due to inadequate after sales service of the firm and non-availability of spares, machines could not be productively used for a considerable period<sup>41</sup> of 764 days.

As per Clause 9.1 of the contract, delivery of 13 machines and spares should have been completed within 15 months from the date of operative

<sup>39</sup> BRM (14), PCT (6), 3X (6) and CSM (20)

<sup>40</sup> M/s JSC "Kalugaputmash", Russia. Contract was executed (No.2009/Track-III/MC/1 dated 06/09/2010)

<sup>41</sup> NWR: 2 machines-125days, NR: 3 machines-84days, NCR: 3 machines- 414 days, ECR: 2 machines-6days & SCR: 3 machines-135days.

Letter of Credit. These machines were received from January 2012 to November 2012. Scrutiny of records, however, revealed the following:

- a. There was considerable delay in making machines fit to move to the consignee's site after arrival at Mumbai. The delay ranged between 31 days and 181 days;
- b. There was also significant delay in commissioning of machines after arrival at the consignee's site. The delay beyond the stipulated commissioning period of 90 days ranged between 94 days and 257 days.
- c. Decision of the Indian Railways to accept the offer of the firm was not in the best financial interest of the Railways and had adverse impact on their performance.

As per clause 19.4 of the contract, 90 *per cent* payment was made on proof of inspection and shipment. However, the balance 10 *per cent* payment is yet to be made which was otherwise to be paid after commissioning of the machines. Indian Railways incurred an expenditure of ₹67.56 crore towards procurement of these 13 fully imported machines.

It was noticed that though the machines were inspected at the factory premises at Kaluga (Russia) by the Deputy Chief Engineers of the consignee railways (NR, NWR, NCR, ECR & SCR) before shipment and certified to be conforming to technical specification, there were instances of frequent breakdown of machines resulting in valuable loss of life of the machine due to 764 days of idling of 13 machines for different spells between November 2012 and April 2014.



Audit further observed that though Railway Board initiated action for recovery of liquidated damages (January 2014) for delay in commissioning of machines, no concrete measures were taken to avoid the frequent breakdown of the machines by providing spares and after sales service in reasonable time. .

(ii) As against sanctioned RSP of 631 of 2006-07, an open tender was invited<sup>42</sup> for supply of 2 Nos of BRMs with hoppers. From the tender committee deliberations it was evident that the Tender Committee was fully aware of the fact that the firm had not produced this type of machine earlier. However, a contract order was placed on the firm<sup>43</sup> for supply of two BRMs at a cost of US \$ 2220466.76 in addition to agency commission of US \$10272.52.

<sup>42</sup> Tender Notice No.0103 of 2006

<sup>43</sup> M/s JSC "Kalugaputmash, a Russian firm (Contract No. 2006/Track-III/MC/3 dated 29/05/2008)

## Ballast Cleaning Machine

As per the conditions of the contract, the machines with their spare parts were to be delivered within 21 months from the date of signing of contract (by October 2010). First machine (BRM-002) was to be delivered to NCR and second one to NWR. The first machine was commissioned on 15 November 2011 (with a delay of 12 months). Within a month of commissioning, the machine went out of order. Since its commissioning, the machine has remained idle for 408 days (47 per cent) as of March 2014 for want of spares/ services and poor response from the firm. As per the conditions of the contract, inspection of the machines was to be carried out before despatch either by the purchaser or his nominee. Accordingly the machines were inspected by the Deputy CE (TM), NCR at the firm's premises in Russia before despatch. It was certified that the machines conformed to all laid down specifications. Hence, breakdown of the machine within one month of its commissioning and subsequent frequent breakdowns<sup>44</sup> indicated casual approach towards inspection of the machine at the level of Dy.CE before shipment.

Though the second machine (BRM-003), reached Mumbai Port by June 2012 (with a delay of 19 months), it took almost 10 months (April 2013) to reach NWR for commissioning. While Clause 11.0 provided that the firm was required to commission the machine within 90 days of its arrival, it was not commissioned (as on March 2014). Since April 2013, the machine had remained idle pending arrival of a service engineer of the firm. As the warranty of the machine was to expire 24 months after the delivery or 18 months from the date of commissioning, whichever is earlier, Railways lost the benefit of warranty clause. Thus, an amount of ₹12.77<sup>45</sup> crore paid to the firm for the procurement of the above machines remained unproductive.

Thus, failure in timely initiation of and delay in finalisation of tenders was indicative of lack of adequate efforts of Railway Board in mechanisation of track maintenance. Further, inefficient contract management led to idling of 13 machines for 764 days and unproductive investment of ₹12.77 crore due to delay in commissioning of another two BRM machines.

**Objective III: To see the efficiency in distribution, utilisation and maintenance of track machines**

#### 2.6.4 Allotment and Distribution

Railway Board distributes the track machines to the Zonal Railways on the basis of the ratio of total working capacity of the machines available in a Zonal Railway to total work potential for that type of machine in the zone. A higher ratio indicates less shortage of the machines and a smaller ratio indicates higher shortage of machines. The Zonal Railway with the least ratio was placed at rank 1 and the Zonal Railway with highest ratio was placed at rank 16 and the allotment was made with reference to ranking. Though the allotment and distribution was made

<sup>44</sup> Dec 2011: 17 days, Feb 2012: 23days, Mar & Apr 2012: 12 days, May, June, July, Aug & Sep 2012: 21 days, Oct 2012 to July 2013: 295 days, Nov & Dec 2013: 11 days and Jan, Feb & Mar 2014: 29 days.

<sup>45</sup> 2010-11: ₹ 5.65 crore, 2012-13: ₹ 7.12 crore (₹12.75 crore as cost of machines & ₹0.02 crore as agency commission for one machine)

adopting a certain criteria, a scrutiny of records relating to availability of different track machines as on 31 March 2014 revealed the following:

- i. An assessment in audit revealed that the requirement of mechanised tamping was 52247 track km<sup>46</sup>. Accordingly, the requirement of plain track tamping machines (other than deployed behind BCMs) worked out to 80 numbers at the rate of 720 km per annum<sup>47</sup>. It was, however, observed that 110 plain track tamping machines (other than deployed behind BCMs ) were in use which indicated that 30 track machines<sup>48</sup> were procured and distributed in excess of requirements in 11 Zonal Railways while NFR, suffered shortage of one machine.
 

*Annexure VI-A*
- ii. Similarly, mechanized tamping requirement (points and crossings) was worked out in Audit as 52682 numbers<sup>49</sup>. The requirement of points & crossing tamping machines (UNIMATS) worked out to 66 numbers at 900 numbers per annum as adopted in the Master Plan. It was, however, observed that 79 numbers of UNIMATs were in use. Thus, 19 points and crossing tamping machines<sup>50</sup> were procured and distributed in excess of requirements for eight Zonal Railways while three Zonal Railways suffered shortage of six machines (NER-1, NR-4 and NWR-1). *Annexure VI-B*
- iii. Deep screening of ballast<sup>51</sup> is being done with group machines - one BCM, one tamping machine and one DTS machine. Number of DTS machines should be equal to number of BCMs as per Para 3.1.4 and 3.2.3 of IRTMM. Thus, the requirement of DTS machines should be equal to BCMs. It was observed that 27 DTS machines<sup>52</sup> were in excess as of March 2014 when compared with the number of BCMs. Despite having excess DTS machines, seven more DTS machines were awaiting receipt by the three Zonal Railways (WR, SR and NCR).
- iv. While 13 Zonal Railways suffered shortage of 30 Plasser's Quick Relaying System (PQRS) machines<sup>53</sup> (for track laying) with respect to their requirements; one Zonal Railway (WR) had three machines in excess.

<sup>46</sup> 50 per cent of 77922+9707 km. being construction unit requirements +1944 kms being tamping requirements due to track renewals

<sup>47</sup> capacity adopted in the Master Plan

<sup>48</sup> NWR (4), SCR (6), CR (3), SECR (5), WCR (1), NCR (1), ER (1), SR (2), NR (3), SER (3) and ECR (2)

<sup>49</sup> (50 per cent of 67570+18901 nos. being construction unit requirements, deep screening requirements and tamping requirements due to point & crossing renewals)

<sup>50</sup> SCR (2), WR (3), CR (3), NFR (2), SER (2), SWR (1), WCR (2) and SECR (4)

<sup>51</sup> Deep screening of ballast on track is being done through BCMs followed by one round of tamping through tamping machines and further followed by track stabilisation through DTS machines as per para 3.3.4 (v) under chapter 3 of IRTMM to restore the speed of 40 kmph immediately after deep screening work

<sup>52</sup> NWR (1), SCR (3), WR (2), CR (1), NER (1), NFR (1), SER (2), SR (2), SECR (3), NR (3), WCR (2), ECR (3), ECoR (1), NCR (2), SWR (-1) and ER (1)

<sup>53</sup> NWR (1), SCR (3), NER (2), NFR (2), SWR (2), SECR (2), NR (9), WCR (1), NCR (4), ECR (1), ER (1), ECoR (1) and CR (1)



- v. Shortage of machines such as BCM<sup>54</sup> (39 shortage), SBCM<sup>55</sup> (18 shortage), and T-28<sup>56</sup> (34 shortage) with respect to requirements was also noticed.

### Appendix B

Thus, the above instances of injudicious distribution of track machines in various Zonal Railways were indicative of the fact that the procurement and distribution of track machines to Zonal Railways was not based on work potential as contended by Railway Board.

#### 2.6.4.1 Fixation of targets by the Railway Board

Fixation of annual targets for the ensuing year for working of track machines is being initiated based on the feed back received from Chief Track Engineers (CTE) of Zonal Railways. There are defined criteria<sup>57</sup> for fixing annual target for working of different types of track machines.

Scrutiny of records relating to fixation of targets by Railway Board revealed that the target was not fixed as per actual requirements of Zonal Railways as discussed below.

#### (a) Target fixed for Plain Track Tamping Activity

During 2009-14, targets fixed by Railway Board for plain track tamping activity were higher by 83266 kms as compared to the requirements assessed by the 12 Zonal Railways<sup>58</sup> and short of requirements by 23534 kms in respect of four Zonal Railways<sup>59</sup>. It was observed that even the requirements assessed by the Zonal Railways were on the higher side when compared with the requirement assessed in audit as evident from the figures of 2013-14 (85080 kms<sup>60</sup>) compared with the requirements assessed in Audit for the same year (50161 kms). On the basis of audit assessment, excess tamping worked out to 79637 km.<sup>61</sup> in 11 Zonal Railways<sup>62</sup> resulting in extra expenditure.

### Appendix- C

<sup>54</sup> NWR (2), SCR (4), WR (5), CR (2), NER (1), NFR (2), SER (1), SWR (2), SR (3), SECR (2), NR (6), WCR (2), ECR (4), ER (1) and ECoR (2)

<sup>55</sup> NWR (1), SCR (2), WR (3), NER (1), NFR (1), SWR (1), SR (2), SECR (1), NR (1), WCR (2), ECR (1), NCR (1) and ER (1)

<sup>56</sup> SCR (4), WR (2), NER (2), NFR (2), SWR (1), SR (2), SECR (4), NR (1), WCR (4), NCR (6), ECR (2), ER (1), NWR (1), CR (1) and SER (1)

<sup>57</sup> For Rail Grinding Machines (RGM): Target had been fixed based on deployment plan prepared by RDSO considering guidelines of periodicity of grinding cycle For TRT, PQRS, T-28 and Rail Threaders: Zone wise output per machine per month during last three years was computed and average output of last three years was taken as base output. Base output was fixed as target subject to minimum of 72 kms per machine per annum for TRT, 24 kms per machine per annum for PQRS, 96 T/Os per machine per annum for T-28 and 72 kms per machine per annum for Rail Threader. For all other machines: Base output was fixed as target subject to minimum of base output (-) 10 per cent and maximum of base output (+) 10 per cent.

<sup>58</sup> CR (9980), ECoR (2047), NCR (7580), NER (887), NFR (842), NR (24338), NWR (2765), SCR (10573), SECR (5699), SR (2514), SWR (4401) and WR (11640)

<sup>59</sup> ECR (4375), ER (2273), SER (7482) and WCR (9404)

<sup>60</sup> NR (4348), WCR (4291), ECR (8100), NCR (3998), ER (5736), ECoR (8774), NWR (3485), SCR (9735), WR (5057), CR (4809), NER (2607), NFR (3353), SER (6105), SECR (3822), SWR (3424) and SR (7436)

<sup>61</sup> Actual Units worked 308929 km – Assessed Requirement 229292 km.-79637 km.

<sup>62</sup> NWR (3908), SCR: (8577), WR (13760), CR (8998), NER (1645), SECR (2656), SR (5849), SWR (4188), NR (16445), ECoR (7312) and NCR (6299)

**(b) Target fixed for deep screening and Shoulder Ballast Cleaning Activity**

As per stipulated yard stick, 10 per cent of the total length of track has to be subjected to deep screening of ballast on track and shoulder ballast cleaning per year. Even as the requirements assessed by Zonal Railways were less for deep screening and shoulder ballast cleaning activity as per stipulated yard stick as compared to the stipulated yard sticks, targets fixed by the Railway Board for working of BCMs were short of requirements for eight Zonal Railways by 2912 kms<sup>63</sup>. Similarly targets fixed for SBCMs by the Board were short of requirements for 13 Zonal Railways by 3829 kms<sup>64</sup>.

*Appendix- C*

**(c) Target fixed for Track Stabilisation Activity**

Targets were fixed in excess of the requirements for all the Zonal Railways by 168198 kms<sup>65</sup>. As a result, actual units worked by DTS during the period of review were in excess of the requirements by 145050 kms incurring avoidable extra expenditure. This was due to working of DTS machine for track stabilisation at other tamping locations as well though the same was not contemplated in Para 3.1.4 and 3.2.3 under Chapter 3 of IRTMM<sup>66</sup>.

*Appendix- C*

**(d) Targets fixed for other track machines**

Targets fixed by Railway Board for other track machines were either in excess or short of Zonal Railways requirements as tabulated below.

**Table 2.4: Fixation of targets with reference to requirement**

Sl	Name of the activity/ Machine working	Excess (Km/No)	Shortage (Km/No)
1	PQRS/ TRT (for track laying)	34 (NWR, CR, SR, SWR)	1738 (NCR, ER, ECR, NR, SECR, SER, SCR, WR, NER, NFR, WCR)
2	Turnout Tamping (for tamping of points and crossings)	23838 (NWR, SCR, WR, CR, NFR, SECR, WCR, NCR)	13946 (NER, SER, SR, SWR, NR, ECR, ECoR and ER)
3	T-28 (for laying of points and crossings)	737 (SCR, SWR, NR, ECoR, NCR)	4654 (ER, ECR, WCR, SR, SECR, SER, NFR, NER, CR, WR, NWR)

*\*In respect of ECoR, there was no shortage or excess for PQRS/ TRT machine.*

Thus, the targets fixed by Railway Board for track machine working were not need based. Targets were fixed either in excess of requirement or fell short of requirement of Zonal Railways leading to carrying out the works beyond requirement or short fall in achievement of mechanized maintenance.

<sup>63</sup>WR (230), CR (235), NER (2), SER (830), SECR (95), NR (719), ECR (518) and ER (283)

<sup>64</sup>NWR (198), WR (93), CR (175), NER (30), SER (481), SECR (145), SR (200), SWR (55), NR (1464), WCR (150), ECR (516), ER (301) and NCR (21)

<sup>65</sup> As brought out in the sub- para [2.7.4(iii)] above, number of DTS machines should be equal to number of BCMs. Hence requirements assessed for working of BCMs by the zones had been adopted in Audit as requirements for working of DTS machines.

<sup>66</sup> Para 3.1.4 and 3.2.3 of IRTMM contemplates only checking and tightening of loose fittings, Replacement of broken fittings, proper consolidation of ballast and checking of final track parameters after tamping by tamping machines.

### 2.6.5. Deficient Planning

#### 2.6.5.1 Method of planning for tamping

IRTMM provides that tamping cycle on PSC sleeper track to be adopted is once in two years or passage of 100 GMT of traffic, whichever is earlier and on other than PSC sleeper track, once a year. In April 2009, Railway Board directed all the Zonal Railways to have need based tamping as per TGI criteria since the existing tamping between 1 and 2 years, as per tamping cycle, was felt on the higher side and also would result in faster ballast degradation and higher requirement of maintenance blocks.

Out of 231433 kms planned for tamping during the review period 2009-14, 26447 kms only had been planned based on TGI criteria<sup>67</sup> and the balance 204986<sup>68</sup> kms had been planned based on tamping cycle<sup>69</sup>. In response to Audit queries regarding non adoption of TGI criteria, Zonal Railway Administrations stated the following.

- (i) Railway Board's instruction to adopt TGI criteria was only in the form of suggestions and had not superseded the provisions of IRTMM (*SCR, NWR, NR*)
- (ii) Need based tamping was adopted instead of TGI criteria (*WR*)
- (iii) TGI criteria was adopted for Group B routes and tamping cycle was adopted for other routes (*SWR*)
- (iv) Tamping Cycle was adopted to maintain track in good condition in view of safety (*SR*)
- (v) Since total length of track in the Zone fell under 25T axle load, tamping cycle as stipulated in IRTMM was adopted (*ECoR*).
- (vi) TGI criteria was not adopted due to absence of provision in this regard in IRTMM (*NCR*)
- (vii) TGI criteria not adopted due to bad bank, deteriorated condition of Rail & Sleeper, Soil erosion, etc (*ER*).

The above contentions of the Zonal Railways were not tenable in the context of Railway Board's directive to assess the tamping requirements as per TGI criteria. Non adoption of TGI criteria not only resulted in extra expenditure due to excess tamping but also resulted in excess utilisation of scarce maintenance blocks. In November 2014, Railway Board had left it to the discretion of Zonal Railways authorities for arriving at the requirements depending on the track conditions till a rational criterion is stipulated.

#### 2.6.5.2 Utilisation of plain track Tamping Machines

Tamping charts prepared for the years 2012-13 and 2013-14 were critically analyzed and the results were as follows:

<sup>67</sup> *SCR (10788), SER (450), NFR (1437), WCR (6173), SECR (1729), SR (1633), WR (826), NER (2158) and ER (1253)*

<sup>68</sup> *NWR (7663), SCR (15633), WR (16573), CR (21062), NER (4486), SER (9732), NFR (10344), SWR (8641), SR (19816), SECR (5817), WCR (7967), NR (21835), ECR (9921), ECoR (13047), NCR (21641) and ER (10808)*

<sup>69</sup> *Period between two tampings*

**(A) Planning Deficiencies**

Out of the total length of 73699 km. of track identified for mechanised maintenance during the 2012-13, 44230 km. of track was to be tamped as per tamping cycle. It was noticed that 48960 km. of track was programmed for tamping during 2012-13. Similarly, out of 36850 km. required to be tamped, 53491 km. of track was tamped during 2013-14. While 1338 km. and 549 km. of track due for tamping was not taken up during 2012-13 and 2013-14 respectively, 7418 km. and 5039 kms of track was included though not due for tamping during the above periods as shown in the table below:

**Table 2.5: Deficiency in planning tamping programme during 2012-14**

Sl. No.	Description	2012-13	2013-14
1	Length of track identified for mechanised maintenance	73699	77922
2	Length of track to be tamped as per prescribed tamping cycle through machines (kms)	36850	44230
3	Length of track included in advance programme (kms)	48960 *	53491 ^
4	Length of track due but not included in the advance programme (kms)	1338 **	549 ^^
5	Length of track not due but included in the advance programme (kms)	7418 ***	5039 ^^

\* Data from ER and NER not made available to audit, \*\* Data from WR, NER, NFR, SER and ER not made available to audit, \*\*\* Data from ER, NER, SER and WR not made available to audit

^ Data not made available to audit for SWR & ER, ^^ Data not made available to audit for SER, SWR & ER

On being pointed out the above deficiencies in planning for tamping, South Western Railway administration stated that the stretches of track were considered for tamping due to less traffic and good geometrical parameters of the section. They further asserted that the section though not due for tamping were planned due to deterioration of track parameters. The contention of the Railway Administration was not supported by scientific data/justification and hence not acceptable as the geometrical parameters of a track is judged through Track Geometry Index (TGI) value which was not adopted for assessing the condition of the track.

**(B) Execution Deficiencies**

'Tamping Chart' depicts the actual execution of tamping of track and the length of track actually tamped. 60409 km. and 58116 km. of track respectively was actually tamped by plain track tamping machines during 2012-13 and 2013-14 respectively. Of them, 10352 km. and 10176 km. of track was tamped though not due<sup>70</sup>. In addition, 5341 kms and 6001 kms of track underwent repeated tamping during the above period which resulted in extra expenditure of ₹ 76.78 crore<sup>71</sup>. Further, 9963

<sup>70</sup> It included the length of track not due but covered in the advance programme

<sup>71</sup> ₹ 34.44 during 2012-13 and ₹ 42.34 crore during 2013-14

kms and 12699 kms of track was also not tamped though due for tamping during the same period.

**Table 2.6: Position showing tamping carried out during 2012-14**

SL. No.	Description	2012-13	2013-14
1	Total Length of Track actually tamped (kms) by machines	60409	58116 #
2	Length of Track Not Tamped though due (kms)	9963 *	12699 ##
3	Length of Track tamped though not due (kms)	10352 **	10176 ###
4	Length of Track tamped repeatedly in the same year (kms)	5341 ***	6001 \$
5	Extra expenditure involved in repeated tamping (₹ in crore)	34.44****	42.34 \$\$

*\*Data not made available to audit by SR, ECoR and ER,\*\* Data not made available to audit by SER, SR and ER,\*\*\* Data not made available to audit by NWR, SER, SR, SECR, NR and ER,\*\*\*\* Data not made available to audit by NWR, SER, SR, SECR, NR and ER,# Data not made available to audit by SWR,## Data not made available to audit by NR, SR and SWR,### Data not made available to audit by NR, SR, SER and SWR,\$ Data not made available to audit by NWR, SER, SWR, SR, NR and SECR,\$\$ Data not made available to audit by NWR, SER, SWR, SR, NR*

A review of the track maintenance activity carried out during 2009-14 with the available track machines other than plain track machines revealed the following:

- i. **Points & crossings tamping machines:** 51764 points and crossings were tamped in excess of requirements by eleven Zonal Railways<sup>72</sup> and 14246 were tamped short of requirements by five Zonal Railways<sup>73</sup>. **Appendix- D**
- ii. **Ballast cleaning machines (BCM):** Out of 40585 km. of track requiring deep screening of ballast (as per yard sticks), 30984 Km. of track was deep screened which included 19617 km. deep screened with BCMs and 11367 km. where deep screening was carried out manually. **Appendix- D**
- iii. **Shoulder ballast cleaning machines:** As against 35755 km. of track requiring shoulder ballast cleaning (as per yard sticks), cleaning of only 16517 km. (46 per cent) had been carried out.
- iv. **DTS Machines:** The utilization of DTS machine was in excess by 145050 km.<sup>74</sup> as compared to requirement of 23804 km. assessed in audit. The excess was due to working of DTS at other tamping locations though not required as per IRTMM.

<sup>72</sup> WR, CR, NFR, SER, SR, NR, WCR, ECR, NCR, ECoR and ER

<sup>73</sup> NWR, SCR, NER, SWR and SECR,

<sup>74</sup> Refer to sub-para 2.7.4.1 (c)



- v. **PQRS Machines:** Status of utilization of PQRS machines during 2009-14 was as follows:
- The quantum of work done for track laying and T-28 for turn out laying was in excess of Railway Board targets by 132 km. in respect of four Zonal Railways<sup>75</sup> and 271 units in respect of SR;
  - The quantum of work done by these machines fell short of Railway Board target by 1845 km. in 12 Zonal Railways<sup>76</sup> and 1928 units in 15 Zonal Railways<sup>77</sup>.
  - As against 11265 kms of track renewal planned<sup>78</sup>, only 5246 kms<sup>79</sup> was done by machines and 5625 kms<sup>80</sup> was done manually and the balance 394 km of planned track renewal was not done.
  - Out of 22020 number of turnout renewals planned<sup>81</sup>, only 9648 were renewed by machines<sup>82</sup> and the balance 12372 numbers renewed manually.
- vi. **Ballast Regulating Machines (BRM):** The quantum of work done in respect of BRM was in excess of Railway Board's target by 4847 km. in respect of five Zonal Railways<sup>83</sup> and short by 16835 kms in respect of 11 Zonal Railways.
- vii. **Multipurpose Tamping Machine (MPT):** The quantum of work done in respect of Multipurpose Tampers (MPTs) was in excess of Railway Board's target by 454 km. in respect of three Zonal Railways (ECR, SWR & SR) and short by 5784 kms in respect of eight Zonal Railways<sup>84</sup>. In the remaining five Railways,<sup>85</sup> MPTs were not available.



UNIMAT

The reason for excess/shortage with reference to requirements/targets was not available on record with the Zonal Railways. The excess working of tamping machines and DTS had resulted in extra expenditure and unnecessary consumption of

<sup>75</sup> SCR-75, NFR-54, NCR-2 and ECoR-1

<sup>76</sup> NWR-27, WR-105, CR-289, NER-23, SER-84, SWR-103, SR-156, SECR-39, NR-460, WCR-285, ECR-123 and ER-151.

<sup>77</sup> NWR-143, SCR-42, WR-59, CR-239, NER-124, NFR-28, SER-171, SWR-139, SECR-68, NR-150, WCR-160, ECR-219, NCR-157, ECoR-31 and ER-198.

<sup>78</sup> NWR-448, SCR-1030, WR-449, CR-660, NER-517, NFR-770, SER-371, SWR-1229, SR-513, SECR-463, NR-1803, WCR-423, ECR-967, NCR-1083, ECoR-78 and ER-461.

<sup>79</sup> NWR-147, SCR-848, WR-139, CR-357, NER-3, NFR-512, SER-177, SWR-185, SR-322, SECR-41, NR-1293, WCR-233, ECR-325, NCR-437, ECoR-53 and ER-175.

<sup>80</sup> NWR-317, SCR-283, WR-354, CR-189, NER-443, NFR-281, SER-458, SWR-666, SR-191, SECR-424, NR-0, WCR-210, ECR-777, NCR-552, ECoR-99 and ER-383.

<sup>81</sup> NWR-1118, SCR-1652, WR-1786, CR-1355, NER-705, NFR-727, SER-1398, SWR-817, SR-1128, SECR-1544, NR-931, WCR-1518, ECR-1700, NCR-2704, ECoR-891 and ER-2046.

<sup>82</sup> NWR-425, SCR-1410, WR-777, CR-229, NER-340, NFR-465, SER-869, SWR-367, SR-1278, SECR-421, NR-876, WCR-403, ECR-709, NCR-311, ECoR-482 and ER-286.

<sup>83</sup> SCR, WR, SWR, ECR and ECoR

<sup>84</sup> NFR, SER, SECR, NR, WCR, NCR, ECoR and ER

<sup>85</sup> NWR, SCR, WR, CR and NER

maintenance blocks. Deep screening of ballast, track laying and turnout renewal works were carried out manually due to shortage of machines.

### C. Provision of maintenance blocks for working of track machines

As stipulated by the Railway Board, maintenance blocks are to be provided as under:

**Table 2.7: Prescribed duration of maintenance blocks**

1.	On Single Line Section	Either one block of at least 4 hours or 2 blocks of 2 <sup>1/2</sup> hours daily or in exceptional cases, minimum 2 hours daily wherever 2 <sup>1/2</sup> hours are not possible
2.	On Double Line Section	a) One spell of 4 hours on "Up" or "Dn" line daily; or b) Two 2 <sup>1/2</sup> hours split blocks on "Up" or "Dn" line on alternate days; or c) One 2 <sup>1/2</sup> hours block on each line daily or in exceptional cases minimum 2 hours wherever 2 <sup>1/2</sup> hours are not possible.
3.	On Construction Projects and Multiple Lines	Additional working hours/ blocks should be planned.

CE and COM of the Railway are required to ensure that the identified corridor blocks as above are incorporated in the working time tables and the requisite blocks are available for maintenance of track.

A review of provision of maintenance blocks for working of track machines for 2012-13 and 2013-14 revealed the following:

- i. Average *per cent* of granted block hours to stipulated Block Hours and Granted Block Hours to Demanded Block Hours during 2012-13 and 2013-14 was about 55 *per cent* and 59 *per cent* respectively;
- ii. Operating department of Zonal Railways granted less block hours within the corridor blocks and lesser average block per spell; and
- iii. In 2012-13, Per cent of Granted Block Hours to Demanded Block Hours was less than the all India average in 10 Zonal Railways<sup>86</sup>. Similarly, in nine Zonal Railways<sup>87</sup>, per cent of Granted Block Hours to Demanded Block Hours were less than the all India average during 2013-14. Details are indicated in *Appendix H*.

<sup>86</sup> SCR (57), CR (52), NFR (56), SER (57), SECR (49), NR (56), WCR (53), ECR (53), NCR (40) and ER (55)

<sup>87</sup> CR (51), NER (50), SER (57), SECR (45), NR (48), WCR (52), ECR (58), NCR (37) and ER (55)

Thus, failure of TMO in demanding full stipulated block hours, granting of less block hours by the Operating department within the corridor blocks and lesser average block per spell had contributed to factors leading to failure in optimal utilization of track machines during the limited maintenance block hours as discussed in the succeeding paragraph (Sub-para-E). Granting of less block hours than was actually required was indicative of absence of due priority by the Railway Administration for maintenance of track .

#### **D. Shortfall in inspections of Track Machines**

Inspections of the machines are to be carried out and the inspection reports sent to SE/MC endorsing a copy to Dy.CE/MC and JE in charge of the machine for compliance. Though Dy.CE and the SE are required to conduct inspections of track machines, periodicity for the same has not been prescribed. The periodicity prescribed for conducting inspections by the AEN and SSE of the TMO is indicated in *Appendix- E*

Scrutiny of records relating to inspections conducted by officers and supervising staff and their inspection reports for the year 2012-13 revealed that while there was a shortfall of 3063 number of inspections at the level of AENs, shortfall at the level of SSEs was 7077. Failure to observe the prescribed frequency of inspection had adverse impact on the fitness of track machines as observed in the succeeding paragraph.

#### **E. Idling of Track Machines**

The idling of track machines is being monitored by the TMO at the Zonal level and reported to Railway Board through monthly progress reports. Cases of idling of track machines due to the reasons such as delay in commissioning of machines, programme not planned, block not planned, block not given by the Operating department, no scope of work, other reasons including shortage of manpower, repairs, engine breakdown, etc were noticed. The details are tabulated below:

**Table 2.9: Loss of machine days due to idling of track machines**

<b>Period</b>	<b>No. of Machines</b>	<b>Total No. of machine days for which the machines were idle</b>	<b>Reasons</b>
April 2009 to March 2014	31 <sup>88</sup>	4185	Delay in commissioning
April 2012 to March 2014	17 <sup>89</sup>	277	Programme Not Planned by TMO
April 2012 to March 2014	133 <sup>90</sup>	10098	Block Not Planned by Divisions

<sup>88</sup> SWR (3), NWR (2), ER (2), SR (1), NR (3), NCR (3), NFR (1), SCR (5), ECR (3), NER (4), ECoR (1) and SECR (3)

<sup>89</sup> NCR (17)

<sup>90</sup> SWR (7), NWR (22), SER (20), ER (23), NFR (10) and SCR (51)

April 2012 to March 2014	160 <sup>91</sup>	3832	Block Not Given by the Operating Department
April 2012 to March 2014	341 <sup>92</sup>	18252	Other reasons such as shortage of manpower, repairs, want of spares, engine break down, oil leakage, etc
April 2012 to March 2014	1 (SR)	730	Stabled due to Operational Problems
December 2013 to March 2014	1 (NER)	120	No scope of work

Some instances of loss due to idling of machines are discussed below:

- I. Indian Railways procured two Rail Grinding Machines (RGMs) at a total cost of ₹190 crore<sup>93</sup>. One RGM was allotted to SCR (February 2011) to cater to the needs of SCR, SR, SWR, SER and ECoR. The other RGM was allotted to NCR to cater to the needs of NCR, NR, ECR and ER. For the utilisation of RGMs, Railway Board issued (May 2009), a Joint Operation and Engineering Circular which stipulates that four hours traffic block per day and six hours mega blocks on weekends be made available. A review of the utilisation of the machines in SCR (during 2011 to 2014) and NCR (during 2011 to 2013) revealed the following:
  - In SCR, it was observed that during the period from 2011 to 2014, as against the target of 2768 block hours (692 working days) to be provided for, only 1946 block hours (486.50 working days) were provided resulting in short provision<sup>94</sup> of 822 [2768-1946] block hours (205.50 working days), Underutilisation of the machine by the Railways had resulted in loss of ₹24.66 crore<sup>95</sup> besides non-accrual of benefits such as increase in rail life on account of reconditioning of rail profile, reduction of frequency of rails renewal and improvement in running quality of tracks.
  - On being pointed out, SCR Administration stated (July 2013) that every effort was made to increase the monthly utilisation of machines but it could not be increased due to infrastructure problems and increase in number of passengers and freight trains (September 2013).

<sup>91</sup>SWR (42), NWR (14), ER (40), SR (12), NFR (1) and SCR (51)

<sup>92</sup>SWR (54), CR (37), NWR (34), SER (31), ER (25), SR (40), WCR (8), NR (9), NCR (24), NFR (31), SCR (18), ECR (14), NER (01) and SECR (15)

<sup>93</sup> from M/s Loram Maintenance of Way Inc, USA under Railway Board's contract (October 2008)

<sup>94</sup> After providing time for weekly schedule for maintenance, shifting, etc.

<sup>95</sup> Cost of idling of the machine was assessed by SCR Administration at ₹0.12 crore per day

- The reply of the Railway Administration was not acceptable as Railway Administration failed in complying with Railway Board's directives through Joint Operation and Engineering Circular (May 2009) for making available stipulated block hours to RGM even by resorting to single line working or cancellation/ regulation of trains. Railway Administration also failed in ensuring due priority in arranging block hours to the RGM as directed by Railway Board (July 2011).
- II. In NCR, as against the target of 2000 block hours to be provided during August 2011 to March 2013, only 941 block hours (47.05 hours per month on an average) were provided resulting in short provision of 1059 block hours (318 days). Out of this, machine could not be utilised for 125 days (416 hours) due to weekly schedule maintenance, shifting, etc. Non-utilization of RGM for 643 hours (193 days) had resulted in a loss of ₹23.16 crore.
- III. Out of two Rail Grinding Machines (RGM) one machine was lying idle in SCR for 84 days during the year 2013 due to failure of two engines. After working for only 5000 hours, the engines prematurely failed within two months from the date of expiry of warranty period. While the Railway Administration stated that the failure occurred due to engine running in overheated condition, the manufacturer attributed the failure to lack of proper daily maintenance. After three years of its procurement, RDSO issued a draft maintenance schedule for RGM in January 2014. It was observed that the periodical schedules of inspection by AEN/ SSE were not carried out. Inadequate maintenance led to idling of RGM, resulting not only in loss of ₹ 8.52 crore (at the rate of ₹ 0.12 crore per day as worked out by SCR administration for 71 days after allowing five days per month for routine maintenance) but also avoidable expenditure of ₹ 0.62 crore towards repairs.
- IV. One Track Machine (VM 170) meant for cleaning the drainages in the track and removing fouled ballast and muck in the track was procured by Railway Board at a cost of ₹9.32 crore and taken over by CR (April 2001). CR utilised the machine till July 2008 and thereafter transferred it to SR as per Railway Board's instructions. While in CR, it had encountered numerous problems which were not rectified. It was stated (July 2004) that the vacuum pump of the machine was beyond economical repairs. Despite the fact, SR agreed to take over the machine (July 2008). To keep the machine working, SR spent an amount of ₹1.13 crore towards repairs/ spares which included replacement of vacuum pump at a cost of ₹0.73 crore. Out of 1066 days (between August 2008 and June 2011), the machine worked for 245 days.

In June 2011, when the SR Administration took up the matter to transfer the machine to some other Railways, Railway Board issued orders to shift the machine back to CR (October 2011). Central Railway Administration, however, did not agree to the proposal. Railway Board, therefore, advised (May 2012) SR to continue to use the machine in SR itself. The machine



continued to remain idle since June 2011. No final decision had been taken either to condemn the machine or put the same into use.

#### F. Repairs and Maintenance of Track Machines

As per provisions contained in Chapter 6 of IRTMM, repairs to and maintenance of track machines are to be carried out as per Schedules I to VII. The periodicity and the duration prescribed for these schedules are indicated in the following table:

**Table 2.10: Periodicity and duration of maintenance schedule**

Schedule	Periodicity	Duration	Location
I	Daily	1 Hour	In the field (Camp Coach)
II	50 Engine Hours	2 Hours	In the field (Camp Coach)
III	100 Engine Hours	1 Day	In the field (Camp Coach)
IV	200 Engine Hours	2 Days	By Mobile Van
V	1000 Engine Hours	7 Days	By Workshop (IOH/POH)
VI	2000 Engine Hours	45 Days	By Workshop (IOH)
VII	6000 Engine Hours	90 Days	By Workshop (POH)

Schedules I to IV were carried out in the field at the locations where the machines were deployed. Intermediate Over hauling (IOH) under schedule V and VI were being done at base depots of Zonal Railways. Schedule VII was being carried out in POH Workshops under SCR and NCR jurisdictions where Periodical Over Hauling (POH) Workshops facilities are available.

Scrutiny of records relating to time taken for overhauling of track machines during 2009-14 revealed the following:

- i. The time consumed for first IOH in respect of 110 machines of seven Zonal Railways<sup>96</sup> exceeded the prescribed time limit by 27 days to 392 days during the review period. Time consumed for the second IOH in respect of 59 machines of eight Zones<sup>97</sup> exceeded the prescribed time limit by 11 days to 373 days.
- ii. The time taken for POH in respect of 97 machines of 14 Zonal Railways<sup>98</sup> exceeded the prescribed time limit by 78 days to 859 days.

<sup>96</sup>SCR (32), CR (6), SER (14), SWR (16), ECoR (5), WCR (17) and WR (20)

<sup>97</sup>SWR (2), SR (6), SECR (5), NR (7), ECR (5), NCR (4), ER (27) and WCR (3)

<sup>98</sup>NWR (3), SCR (10), WR (4), CR (7), SER (3), SWR (4), SR (5), NR (21), ECR (3), ECoR (2), NCR (5), ER (9), NFR (9) and WCR (12)

- iii. In SER, machines were taken up for IOH in the same year before they became due in terms of worked units and thereby violated the prescribed norms for IOH as detailed below:

**Table 2.11: Premature overhauling of track machines**

Name of Machine	Year	IOH	Output during the year (km.)	Yardstick <sup>99</sup> (work units between IOH)
BCM-342	2009-10	1 <sup>st</sup> and 2 <sup>nd</sup>	43.09	175
BCM-318	2009-10	1 <sup>st</sup> and 2 <sup>nd</sup>	45.58	175
FRM-1887	2009-10	1 <sup>st</sup> and 2 <sup>nd</sup>	102.06	500

Thus, excess time taken for overhauling of track machines resulted in non availability of those machines for maintenance of track. In addition, premature overhauling of track machines indicated lack of monitoring in planning of maintenance schedules.

### 2.6.5.3 Condemnation of Track Machines

#### A. Premature condemnation of track machines

The life of track machines is computed in terms of gross units of work done as indicated in Annexure 5.9 of IRTMM. Further, as per Railway Board's instructions, no machine should be condemned before the codal life of 18 years and the life stipulated in terms of work done.

Scrutiny of records relating to condemnation of track machines revealed that :

- i. Eight track machines had been prematurely condemned before completing the stipulated life of machines in terms of units of work done<sup>100</sup> and four machines had been prematurely condemned before the completion of 18 years<sup>101</sup>.
- ii. Two machines (NWR 01, SER-01) were prematurely condemned before completion of life of machine in terms of work done and before completion of Codal life in terms of years.
- iii. The premature condemnation was mainly due to limited capacity of the machine (WR and NR), inferior quality of work done (CR), frequent breakdowns, irreparable conditions of the machine and non-availability of spares (CR, SER, SWR, SECR and NCR). The reasons cited for premature condemnation were indicative of inadequate maintenance of machines.

#### *Annexure-VIIA*

<sup>99</sup> Yardstick as laid down vide Correction Slip no. 10 dated 12/12/2006 to IRTMM March 2000

<sup>100</sup> CR (2), SER (2), SWR (1), SECR (2) and NR (1)

<sup>101</sup> WR (1), NR (1) and NCR (2)

### B. Non disposal and delay in disposal of the condemned machines

During 2009-14, 46 track machines were condemned with the approval of Railway Board. Scrutiny of records relating to disposal of condemned track machines revealed the following:

- i. 18 machines<sup>102</sup> were not disposed off as scrap as on 31 March 2014. The machines were lying without disposal for the period ranging from 7 months to 323 months from the date of grounding to March 2014.
- ii. In seven Railways<sup>103</sup>, 27 machines were disposed off as scrap with a delay ranging from 4 months to 155 months after allowing a reasonable period of twelve months from the date of grounding.
- iii. In respect of the machines disposed off, no write back adjustments to the capital were carried out for the scrap value and for the value of salvaged parts of the machines. The avoidable dividend liability due to delay in disposal and non write back of adjustments to capital in respect of 23 machines<sup>104</sup>, where data was available, worked out to ₹2.69 crore<sup>105</sup>.
- iv. The reasons for non disposal/ undue delay in disposal of machines was due to delay in sending proposals to Railway Board for condemnation, delay in according approval and delay in disposal as scrap. *Annexure VII (B and C)*

### C. Track machines stabled for condemnation

As per Railway Board's instructions, no machine should be shown as stabled for condemnation unless a complete proposal is submitted by the field office to Headquarters for taking administrative decision to refer the case to the survey committee.

A review of the track machines stabled for condemnation as at the end of March 2014 revealed that:

- i. Out of 33 machines stabled for condemnation, 31 machines were stabled ranging from 7 months to 240 months from the date of grounding<sup>106</sup> (date of grounding for 2 machines was not available).
- ii. Proposals for condemnation of 25 machines<sup>107</sup> had not been submitted to Railway Board. Approval of condemnation by the Board was pending in respect of eight machines<sup>108</sup>.
- iii. The reasons for non- submission / delayed submission of proposal to Railway Board was due to non-availability of SAG officers, delayed submission of detailed report to Headquarters by field units (WR) delayed in receipt of condemnation report from the nominated standing committee (CR), delay in formation of SAG committee (NR and SR), proposal to sell the machine to IRCON (SCR) delay in conducting Joint Inspection (NCR).

<sup>102</sup>NCR (2), SECR (1), SER (2), SR (5), WCR (1), WR (5), ER (1) and NER (1)

<sup>103</sup>SCR (2), SER (3), SWR (1), SECR (3), NR (14), ER (1) and SR (3)

<sup>104</sup>SER (4), SWR (1), SECR (3), NR (12), ER (1) and SCR (2)

<sup>105</sup>SCR: ₹0.03crore, SER: ₹0.514 crore, SWR: ₹0.19 crore, SECR: ₹0.32 crore, NR: ₹1.55 crore and ER: ₹0.0823 crore

<sup>106</sup>NWR (2), SCR (2), CR (3), WR (5), NER (1), SER (1), NR (4), NCR (4) and SR (11)

<sup>107</sup>NWR (2), SCR (1), CR (3), NER (1), SER (1) NR (4), NCR (2) and SR (11)

<sup>108</sup>SCR (1), WR (5) and NCR (2)

The reasons were not available in respect of SER, NER and NWR.

### **Annexure VIII**

- iv. Master Plan for procurement of machines had been prepared taking in to account the track machines due for condemnation on age basis. The non condemnation /disposal of the same had led to procurement of machines on replacement account without actually disposing of the old machines. Instances of indecisiveness as observed in SER and NER in condemning track machines are discussed below:
- a) SER administration, proposed (March 2004) to Railway Board (March 2009) for condemnation of one Duomatic tamping machine (commissioned in October 1987) on age cum condition basis. After a lapse of almost six years, Railway Board accorded administrative approval (February 2010) for conversion of this machine into a self propelled Rail Borne Maintenance Vehicle (RBMV), which was lying idle at TMD/ Kharagpur since July 2009, either by SER or through Central Periodical Overhauling (CPOH) Workshop of NCR. The machine was dispatched to CPOH Workshop (July 2010). After a lapse of nearly two years, CPOH intimated SER (March 2012) that the conversion work could not be taken up due to non-availability of prior experience and increased work load in CPOH workshop. SER was advised to go for condemnation instead of conversion. In May 2012, SER advised NCR to scrap the machine and transfer the credit value to SER. However, the machine had neither been converted into RBM Vehicle nor condemned till September 2014.
  - b) In August 2008, NER received one Rail Cum Road Vehicle (RCRV) from NCR where it was commissioned in July 2002. RCRV was meant for transportation of Railway material from worksites. Since its arrival at NER, the machine remained idle as it was not in working condition. The Codal life of such vehicles is 15 years which implied that 40 per cent of the codal life of the vehicle was lost without any productive yield.

Thus, non disposal of the machines had resulted in payment of dividend liability to general revenues.

**Objective IV: To see whether a proper system was in place for assessing the requirement of manpower and its effective deployment ensuring continued operations**

#### **2.6.6 Staff availability vis-à-vis actual requirement**

As per Para 8.2.1 of IRTMM the staff required for machine working is grouped into three categories namely i) Staff for field operation, ii) Staff for field supervision, technical and general services and iii) Staff for repairs and maintenance, excluding POH.

While scale of staff for field operation has been laid down for each type of machine separately, scales of staff for other groups have been laid down for the units of the machines giving weightage factors to different types of machines, as provided in Para A of Annexure 8. 1 of IRTMM.

Sanctioned strength vis-à-vis men in position as on 31 March 14 for various categories of staff such as SSE/ JE/ TMM and helper with reference to requirements prescribed in Chapter 8 of IRTMM revealed that all the 16 Zonal Railways suffered shortage ranging between 19.35 *per cent* and 69.15 *per cent* in respect of SSE/JE, 2.94 *per cent* and 63.57 *per cent* (except in SWR where there was no shortage) for TMM and 3.20 and 66.01 *per cent* (except in NFR where number of helpers were in excess by 15.38 *per cent*) for Helper as indicated in *Appendix- F*.

The shortage of staff had resulted in loss of machine days due to idling of machines as pointed out in sub-para 2.6.5.2 (E)

#### **2.6.6.1. Surrender of Trackmen Posts consequent upon introduction of track machines**

The creation of posts in TMO for manning new machines has been done with matching surrender of trackmen posts by adopting a formula for calculating the requirement of trackmen in respect of track maintained by track machines. Scrutiny of records revealed that there was shortage of trackmen on rolls in general as compared to the sanctioned strength. Hence surrender of posts of trackmen and their redeployment due to progressive mechanisation of track maintenance was covered under existing vacancies.

#### **2.6.6.2 Training of track machine operators**

Indian Railways Track Machines Training Centre (IRTMTTC), Allahabad imparts training to the track machine operators. Dy.CE/ TM issues competency certificates valid initially for three years and renews it for a further period of three years after holding a test. However, the machine operators should undergo refresher courses at IRTMTTC once in three years.

Scrutiny of records relating to training of track machine operators during 2009-14 revealed that:

- i. Out of 2980 numbers of operators due for training in 16 Zonal Railways (except in ECR where the records were not available), there was a shortfall of 703 numbers of operators in undergoing training during the review period.
- ii. While the overall shortage was about 20 *per cent*, the highest percentage of shortfall of operators in attending training at IRTMTTC was from ER followed by ECR, NR, WCR and SER. The shortfall was due to imparting training to staff locally (ER) and shortage of staff (other Railways).
- iii. 101 numbers of staff<sup>109</sup> had left the service during the training programme. As per conditions of engagement of the trainees, when staff deserts the training programme without completing it or do not serve for stipulated period of service after training, the cost of training, pay and allowances are to be realized from them. It was, however, observed that an amount of

<sup>109</sup> ECoR (10), ER (25), NCR (6), NR (3), SCR (15), SER (7), SWR (32) and WCR (3)



₹2.16 crore (March 2014) was not realised from the staff responsible for violation of conditions of engagement of trainees. **Appendix- G**

**Objective V: The effectiveness of Management Information System adopted by Track Machine Organization and other issues related to consumption of fuel, accounting procedures, etc.**

**2.6.7 Track Management System**

Indian Railways introduced “Track Management System (TMS)” as an aid to field Engineers in optimal, efficient and effective resource allocation in addition to decision making to minimize the cost of track maintenance. As a part of TMS, the progress of work done by the machines is uploaded in the TMS.

A comparison of work done during 2013 -14 by track machines uploaded in TMS with that reported to Railway Board by TMO revealed the following discrepancies.

- i. Quantum of work done by track machines as per reports submitted to Railway Board by TMO varied as compared to quantum of work done as per TMS (track). Wide variations were observed in 10 Zonal Railways<sup>110</sup> as detailed in *Appendix I*
- ii. TMS was not implemented fully across the divisions in Five Zonal Railways<sup>111</sup> and therefore, comparison of data between TMS and TMO could not be made;
- iii. The difference was reported to be due to quantum of work done as reported to Railway Board by TMO including repetitions of the work done by tamping machines at the same location depending on the site conditions to get the desired track parameters. It was, however, observed that no site reports had been maintained for excess working of the machines.

On being pointed out the issue of variation in reporting of quantum of work done by TMS and TMO, some Zonal Railways cited the following reasons:

- a) Working of machines in Construction Unit not reflected in TMS and discrepancy in TMS Feeding (ECoR)
- b) Incorrect uploading of quantum of work done in TMS (machine) by Engineering Controllers of respective Divisions (SWR)
- c) Due to wrong conversion, TMO shows progress based on number of sleepers for tamping machine and actual run of machine for other machines whereas TMS(Machine) enter progress based on kilometerage (electrical mast Chainage) as per available facility (SER)

TMS is a vital tool for the apex management level decision making such as procurement and condemnations of machines. Variation in quantum of work done as per TMS (machine) as compared to that reported to Railway Board by TMO had

<sup>110</sup> ECoR, ECR, NFR, NR, NWR, SCR, SECR, SER, SWR and WR

<sup>111</sup> NER, CR, SR, ER and WCR

adverse impact in making judicious decision and proper planning for maintenance of track as brought out in Paragraphs 2.6.4 and 2.6.5.

### 2.6.8 Comparative analysis of consumption of HSD oil

A comparative analysis of consumption of HSD oil per unit of work done during 2011-12 and 2012-13 across Zonal Railways and also within the same Zonal Railway revealed that

- i. Consumption of HSD oil by the same machines in 2011-12 and 2012-13 (between 2010-11 and 2011-12 in respect of ECR) varied widely. After providing a reasonable allowance of 15 per cent variation, excess consumption ranged from 15 per cent to 2379 per cent between the two consecutive years in respect of 264 machines<sup>112</sup> as shown in *Appendix- J-1*.
- ii. Consumption of HSD oil for similar type of machines for unit of work done varied widely across the Zonal Railways. After allowing a reasonable allowance of 25 per cent variation on an average consumption for different site conditions, 60 track machines of 12 Zonal Railways suffered excess consumption in comparison to average consumption of all Zonal Railways for similar type of machines. The excess consumption ranged from 25 per cent to 293 per cent for the year 2012-13 as shown in *Appendix J-2*.

The wide variation in consumption of HSD oil by the similar machines and also excess consumption by the machines was indicative of lack of adequate internal control in monitoring consumption and identification of causes for excess consumption for initiating appropriate remedial measures in this regard.

### 2.6.9 Accounting of expenditure and realisation of credits for working of track machines

The expenditure of TMO is booked initially to Demand No.07-221. At the end of the year, based on the unit cost of working which comprised of expenditure on operation and Bills/ Adjustment Memo (AM) are being raised on Divisions, Construction units and outsiders where the track machines worked during the year. On acceptance of the AMs, credits are afforded to Demand No.07-221 duly debiting the amounts to Demand No.04 and to Open Line Works (Revenue) by Divisions and to Projects by Construction Units. After the credit adjustments, net figure is reflected under Demand No.07-221 in the Appropriation Accounts. Scrutiny of records, however, revealed the following deficiencies in accounting of expenditure:

- i. Out of 16 Zonal Railways, 13 Zonal Railways followed the extant procedures except in three Zonal Railways (SECR, WCR and ER) where no credit adjustments were made and the entire expenditure of TMO was booked to Demand No.07-221.
- ii. In four Zonal Railways (WR, SER, ECoR and NWR), only meager amount of credit adjustments towards amounts realized from outsiders were made. In

<sup>112</sup>CR (24), ER (4), NCR (26), NER (13), ECoR (6), NFR (22), NR (24), NWR (11), SCR (18), SECR (12), SR (3), SWR (9), WCR (21), WR (24), SER (19) and ECR (28)

- ECR, the adjusted credit did not include Capital Recovery Factor (CRF) amount.
- iii. An amount of ₹ 782.25 crore was afforded as credit to Demand No.07-221 in respect of 13 Zonal Railways<sup>113</sup> which included ₹ 184.89 crore towards CRF. Crediting CRF amount to Revenue Head (Demand No.07-221) instead of crediting to capital head of account had resulted in avoidable dividend liability of ₹23.89 crore during the review period 2009-14.
  - iv. Short realization of credits due to non adoption of the unit cost of the year in which machines were deployed worked out to ₹ 175.89 crore in respect of 13 Zonal Railways.

*Appendix-K*

## 2.7 Conclusion

In the Master Plan 2010-20, Railway Board projected the requirement of 396 track machines. The assessment of Railway Board was on the higher side as it did not take into account the trend of actual growth of track and adoption of tamping cycle as provided in the manual of Indian Railways (IR) and based on TGI criteria. Track machines are mostly imported. No action plan was drawn by the IR for developing of indigenous capabilities in respect of highly complex track machines in a time bound manner. There were delays in procurement of track machines either due to non-finalisation of technical specifications or due to paucity of funds. Inefficient contract management led to idling of 13 worksite tamping machines procured at a cost of ₹67.56 crore and also rendered the investment of US\$ 1,115,369 unproductive due to non-commissioning of another ballast regulating machine machines.

Work load in the Zonal Railways was not properly assessed for distribution of track machines resulting in excess allotment of track machines to some Zonal Railways while in some other Zonal Railways, less track machines were distributed than the requirement. Fixation of target by Railway Board for various track maintenance activities was not commensurate with the field requirement and was also not based on TGI criteria recommended by Railway Board for assessment of tamping requirement.

Deficient planning resulted in tamping of tracks in excess of programmed tamping. Over utilisation of machines to perform various track maintenance activities in excess of actual requirement resulted in extra expenditure and unnecessary consumption of scarce maintenance blocks.

Failure of Track Machine Office in demanding stipulated block hours and granting of less block hours by the Operations Department resulted in idling of the machines. There were instances of premature condemnations of track machines. Delay in condemnation and their disposal led to avoidable payment of dividend liability to General Revenues. Significant shortage of staff for operation and maintenance of machines had resulted in idling of machines. TMS which is considered as a vital tool aiding in decision making process failed in achieving its desired objective as the quantum of work done by machines as uploaded in Track

<sup>113</sup>NWR, SCR, CR, NER, NFR, SER, SWR, SR, NR, ECR, ECoR, NCR and WR

Management System (TMS) varied from the quantum reported to Railway Board by TMO.

### Recommendations

Track Machine Directorate at Railway Board and TMOs at zonal level are dedicated wings responsible for procurement and monitoring of utilisation of track machines. Based on the findings of the review, following recommendations are made for implementation:

- i. Railway Board needs to ensure that the distribution of track machines is made after judicious assessment of the requirement of the Zonal Railways so as to avoid holding of track machines in excess of requirement.*
- ii. Railway Board needs to frame a comprehensive action plan for indigenous development of track machines in a time bound manner.*
- iii. Targets for various track maintenance activities need to be realistic and fixed after due assessment of the workload of Zonal Railways.*
- iv. Track machines available in the Zonal Railways need to be optimally utilised to minimise the extra expenditure and unnecessary consumption of scarce maintenance blocks. Effective measures need to be taken to minimise idling of machines.*
- v. Monitoring mechanism needs to be strengthened to ensure timely disposal of condemned machines.*
- vi. Proper coordination with operating department should be made by TMO to ensure adequate block hours for proper and adequate maintenance of track.*
- vii. The variation in quantum of work done as per TMS (machine) as compared to that reported to Railway Board by TMO should be periodically reconciled for efficient planning.*

The matter was brought to the notice of Railway Board in January 2015; their reply has not been received (May 2015).



*Appendix-A (Para 2.1)*

**Different types of track machines**

**A. Plain Track and Turnout Tamping works**

<b>Duomatic Tamping Machine</b>	
	For packing of ballast under sleepers, correction of alignment and correction of longitudinal and cross levels, tamping machines are deployed. While Universal Tamping (UTs) Machines tamp one sleeper at a time, Duomatic Tamping Machines (DUOs) tamp two sleepers at a time.
<b>UNIMAT</b>	
	For the purposes of lifting, levelling, aligning and tamping Points and Crossings (Turnouts) in yards and bridge approaches with check rails, Points & Crossing Tamping Machines (UNIMATs) are deployed.
<b>Multi purpose tamping machine</b>	<b>Ballast Cleaning Machine</b>
	
For tamping plain track along with points and crossings, Multipurpose Tampers (MPTs) are used.	To carry out ballast cleaning and for removal of muck for improvement of drainage Ballast Cleaning Machines (BCMs) are utilised.



### Shoulder Ballast Cleaning Machine



For cleaning of shoulder ballast for improved drainage of track, specialised machine - Shoulder Ballast Cleaning Machines are deployed.

## Appendix- B (Para 2.6.4)

Table I: Statement showing requirement and shortage of PQRS machines

Total length of track renewals planned through machines & manually during 2013-14 in Kms	Number of PQRS			
	Required (at the rate of 33 kms. per annum) in Nos.	In use (in Nos.)	Exces in Nos.	Shortage in Nos.
1944	65	39	3	30

Table II: Statement showing requirement and shortage of BCM

Total length of main track for mechanised maintenance (in Kms) during 2013-14	Number of Turnouts planned for deep screening	Track requiring Ballast cleaning (in Kms) 10% of col 1+(col 2*0.75) in Kms	Requirement of BCM @ 72 Kms per annum in Nos	No of BCMs In use in Nos.	Excess in Nos.	Shortage in Nos.
77922	1468	8893	123	84	0	39

Table III: Statement showing requirement and shortage of SBCMs

Total length of main track for mechanised maintenance (in Kms) during 2013-14	Track requiring shoulder Ballast cleaning (in Kms) 10% of col 1	Requirement of SBCM @ 168 kms per annum in Nos.	No of SBCMs In use	Excess in Nos.	Shortage in Nos.
77922	7792	48	30	0	18

Table IV: Statement showing requirement and shortage of T-28s

No of T/Os renewals planned through machines & manually during 2013-14	No of T-28 required (at the rate of 67 T/Os. per annum)	Nos. in use	Excess in Nos.	Shortage in Nos.
3574	62	28	0	34

**Appendix –C [Para 2.6.4.1 (a), (b) & (c)]**

**Table I: Fixation of target for plain track tamping activity and for deep screening/cleaning of ballast**

Name of the activity	Requirements as assessed by Zonal Railways	Railway Board's Targets	Railway Board's Targets fixed in excess of requirements	Railway Board's Target fixed in short of requirements
Plain track tamping in Kms	359075	418807	83266	23534
Ballast cleaning through BCMs in Kms	23804	21702	-	2912
Shoulder ballast cleaning through SBCM	21134	17455	-	3829

**Table II: Fixation of target for track stabilisation activity**

Name of the activity	Requirements adopted in audit for working of DTS	Railway Board's Target	Rly. Board's Targets fixed in excess of requirements	Actual units worked	Excess units worked with reference to requirements
Track stabilisation through DTS in Kms	23804	192002	168198	168854	145050

**Table III: Fixation of target for track machines such as PQRS, Turnout Tamping, T-28**

Sl	Name of the activity/ Machine working	Excess (Km/No)	Shortage (Km/No)
1	PQRS/ TRT (for track laying)	34 (NWR, CR, SR, SWR)	1738 (NCR, ER, ECR, NR, SECR, SER, SCR, WR, NER, NFR, WCR)
2	Turnout Tamping (for tamping of points and crossings)	23838 (NWR, SCR, WR, CR, NFR, SECR, WCR, NCR)	13946 (NER, SER, SR, SWR, NR, ECR, ECoR and ER)
3	T-28 (for laying of points and crossings)	737 (SCR, SWR, NR, ECoR, NCR)	4654 (ER, ECR, WCR, SR, SECR, SER, NFR, NER, CR, WR, NWR)

*\*In respect of ECoR, there was no shortage or excess for PQRS/ TRT machine.*

## Appendix- D [Para 2.6.5.2 (b)]

**Table I: Tamping activity carried out by Points and Crossings tamping machines**

Total No. of Point & crossings for mechanized maintenance	Tamping Requirement due to planned T/o renewals & Deep screening of T/Os	Construction requirements	Points & crossings required for tamping during the year @ 50% for Col.1 + Col 2 + Col 3	No of Points & Crossings actually tamped	Excess tamped with respect to Col. 5	Shortage tamped with respect to Col. 5
1	2	3	4	5	6	7
216238	30015	21633	179598	217117	51764	14246

**Table II: Deep Screening activity carried out Ballast Cleaning Machines**

Total length of track on B.G nominated for mechanised maintenance(in Kms) & Turn Out in number	Length of track required for deep screening through BCMs @ 10 per cent of Col.1+Turn Out @ 0.75km/No.	Length of track and T/Os actually deep screened through BCMs	Shortage	Length of track and T/Os actually deep screened manually
1	2	3	4	5
357374+6463	40585	19617	20968	11367

**Table III: Shoulder ballast activity carried out Shoulder ballast cleaning machines**

length of track on B.G for mechanised maintenance (in Km.)	Length of track required for ballast cleaning through SBCMs @10 per cent of Col (1)	Length of track actually cleaned through SBCMs	Shortage with respect to Col. 2
1	2	3	4
357554	35755	16517	19238

## Appendix-E [Para 2.6.5.2 (d)]

Table I: Periodicity for conducting inspection by TMO

No	Type of Machine	Inspection Schedule	
		AEN/MC *	SSE/MC
1	CSM	Monthly	Fortnightly
2	UNIMAT	Monthly	Fortnightly
3	BCM	Fortnightly	Weekly
4	BRM	Once in Two Months	Monthly
5	SBCM	Monthly	Fortnightly
6	DTS	Once in Two Months	Monthly
7	UNO	Monthly	Fortnightly
8	DUO	Monthly	Fortnightly
9	T028	Monthly	Fortnightly
10	PQRS	Monthly	Fortnightly
11	TRT	Weekly	Daily

\*SEN/MC should carry out these inspections if no AEN/MC is posted under him.

## Appendix-F (Para 2.6.6)

Table I: Status of Men- in - position

Sl	Zonal Railway	Percentage Excess (+) / Shortage (-)		
		SSE/JE	TMM	Helper
1	CR	(-) 57.56	(-) 48.70	(-) 48.43
2	ECoR	(-) 39.86	(-) 2.94	(-) 23.76
3	ECR	(-) 57.92	(-) 43.73	(-) 55.03
4	ER	(-) 47.43	(-) 53.18	(-) 45.80
5	NCR	(-) 53.09	(-) 48.55	(-) 21.18
6	NER	(-) 65.00	(-) 63.57	(-) 40.91
7	NFR	(-) 32.71	(-) 11.19	(+) 15.38
8	NR	(-) 52.96	(-) 39.41	(-) 22.07
9	NWR	(-) 61.29	(-) 50.64	(-) 55.38
10	SCR	(-) 50.42	(-) 43.65	(-) 55.56
11	SECR	(-) 32.99	(-) 30.67	(-) 3.20
12	SER	(-) 24.07	(-) 21.09	(-) 38.51
13	SR	(-) 42.48	(-) 31.89	(-) 66.01
14	SWR	(-) 19.35	0.00	(-) 22.15
15	WCR	(-) 69.15	(-) 52.48	(-) 57.06
16	WR	(-) 45.88	(-) 38.28	(-) 29.28
	Average	(-) 46.98	(-) 35.12	(-) 34.88



## Appendix-G (Para 2.6.6.2)

Table I: Shortfall in training of operators

Sl	Zonal Railway	No. of operators due for training	Shortfall	Percentage of shortfall	Reasons attributed for shortfall
1	CR	243	25	10	Staff working at various offices
2	ECoR	114	0	0	---
3	ECR	210	87	41	Shortage in operators' cadre
4	ER	287	246	86	Staff are undergoing training locally also
5	NCR	303	31	10	Shortage of Staff
6	NER	32	2	6	Shortage of Staff
7	NFR	63	2	3	Administrative reasons
8	NR	346	118	34	Shortage of Staff
9	NWR	74	7	9	Shortage of Staff
10	SCR	321	0	0	---
11	SECR	81	0	0	---
12	SER	512	117	23	Shortage of Staff
13	SR	145	0	0	---
14	SWR	106	1	1	Due to IOH works at base depot
15	WCR	195	65	33	Shortage of staff
16	WR	164	2	1	Administrative/ Personal reasons

## Appendix-H (Para 2.6.5.2 C)

Table 7: Status of demanded block, stipulated block and granted block hours

Sl. No.	Description	2012-13		2013-14	
		Average for the 16 ZRs	No. of ZRs having less than All India Average	Average for the 16 ZRs	No. Of ZRs having less than All India Average
1	Per cent of Demanded Block Hours to Stipulated Block Hours	100 per cent (SECR, ECR, ECoR & NCR) Average for the Balance 12 ZRs = 87 per cent		100 per cent (SCR, SR, SECR, ECoR & NCR) Average for the Balance 11 ZRs = 89 per cent	
2	Per cent of Granted Block Hours to Stipulated Block Hours	54 per cent	8 ZRs <sup>114</sup>	55 per cent	8 ZRs <sup>115</sup>
3	Per cent of Granted Block Hours to Demanded Block Hours	59 per cent	10 ZRs <sup>116</sup>	58 per cent	9 ZRs <sup>117</sup>
4	Per cent of Block Hours Granted falling within the Corridor Block	43.12 per cent (14 ZRs <sup>118</sup> )	8 ZRs <sup>119</sup>	42.41 per cent	9 ZRs <sup>120</sup>
5	Average Block per Spell	1 Hr. 7 Min	8 ZRs <sup>121</sup>	1 Hr. 45 Min	8 ZRs <sup>122</sup>

<sup>114</sup> CR (45), NER (42), NFR (44), SECR (51), NR (41), WCR (46), NCR (46) and ER (48)

<sup>115</sup> CR (44), NER (39), SWR (51), SECR (47), NR (37), WCR (44), NCR (42) and ER (48)

<sup>116</sup> SCR (57), CR (52), NFR (56), SER (57), SECR (49), NR (56), WCR (53), ECR (53), NCR (40) and ER (55)

<sup>117</sup> CR (51), NER (50), SER (57), SECR (45), NR (48), WCR (52), ECR (58), NCR (37) and ER (55)

<sup>118</sup> NER and NR = Data Not Available

<sup>119</sup> WR (42), NFR (37), SWR (24), SR (34), SECR (25), WCR (30), ECR (25) and NCR (23)

<sup>120</sup> WR (40), NER (14), NFR (24), SWR (16), SR (33), SECR (33), NR (36), ECR (25) and NCR (29)

<sup>121</sup> SCR, WR, CR, NER, NFR, SWR, WCR and NCR

<sup>122</sup> SCR, CR, NER, SWR, NR, WCR, ECoR and NCR

## Appendix- I (Para 2.6.7)

Table I: Comparison of reporting of work done by TMO and TMS

Railway	Tamping Machines		Other than Tamping Machines	
	Range of variation in <i>per cent</i>	No. of machines	Range of variation in <i>per cent</i>	No. of machines
CR *	--	--	--	--
ER *	--	--	--	--
ECoR	2 to 31	11 <sup>123</sup>	-1 to 75	12 <sup>124</sup>
ECR	8 to 170	17 <sup>125</sup>	Nil	Nil
NCR ^	--	--	--	--
NER	---	---	---	---
NFR	-10 to 118	11 <sup>126</sup>	-100 to 115	19 <sup>127</sup>
NR	-100 to 104	29 <sup>128</sup>	-100 to 138	34 <sup>129</sup>
NWR	15 to 64	7 <sup>130</sup>	-70 to 51	6 <sup>131</sup>
SCR	-1 to 89	25 <sup>132</sup>	1 to 172	19 <sup>133</sup>
SECR	3 to 215	15 <sup>134</sup>	-14 to 79	15 <sup>135</sup>
SER	8 to 160	15 <sup>136</sup>	-74 to 4692	24 <sup>137</sup>
SR *	--	--	--	--
SWR	9 to 78	9 <sup>138</sup>	-37 to 148	11 <sup>139</sup>
WCR *	--	--	--	--
WR	23 to 84	19 <sup>140</sup>	-12 to 102	33 <sup>141</sup>

\*TMS is not implemented fully across the divisions of these Five ZRs (NER, CR, SR, ER and WCR). Hence, comparison of data between TMS and TMO could not be made.

^ Data maintained by Control Office is adopted by both TMS and TMO (NCR). Hence, no difference in reporting.

<sup>123</sup> CSM (2), UNI (3), MPT (1) and DUO (5)

<sup>124</sup> BCM (1), FRM (1), PBR (3), UTV (1), T28 (1) and DGS (5)

<sup>125</sup> DUO(7),VPR(2),TXP(1),UNI(4)&CSM(3)

<sup>126</sup> CSM (2), DUO(4), MPT(1),UNI(3) & TEX(1)

<sup>127</sup> DTS(4),BCM(3),SBCM(1),BRM(3),T-28(1),PQRS(3) & UTV(4)

<sup>128</sup> 3X(1),CSM(6),MPT(1),UNI(7),WST(14)

<sup>129</sup> BCM(7),BRM(4),DTS(10),FRM(4),PQRS(4),RGM(1),T-28(2),TRT(2)

<sup>130</sup> CSM (1), WST (2), VPR (2) and UNI (2)

<sup>131</sup> BRM (2), DTS (1), PQRS (1) and UTV (2)

<sup>132</sup> 3X (1), CSM (7), DUO (12) and UNI (5)

<sup>133</sup> BRM (6), DGS (11), PQRS (1) and RGM (1)

<sup>134</sup> CSM (3), DUO (5), UNI (4) and MPT (3)

<sup>135</sup> BCM (3), BRM (2), DGS (3), T28 (1) and UTV (6)

<sup>136</sup> CSM (3), DUO (6), UNI (5) and MPT (1)

<sup>137</sup> T28 (3), DGS (7), PQRS (3), FRM (2), BCM (4) and BRM (5)

<sup>138</sup> CSM (2), DUO (3), MPT (3) and UNI (1)

<sup>139</sup> T28 (1), BCM (4), FRM (1), DGS (2), PQRS (2) and PBR (1)

<sup>140</sup> 3X(1),CSM(4),DUO(7),UNI(7)

<sup>141</sup> BCM(7),PQRS(2),BRM(3),DTS(9),T-28(4),SBCM(1),UTV(7)

**Table II: Variation in reporting of quantum of work done by TMS (Machine) and TMO of Zonal Railways**

Zonal Railways	Range of variation in per cent	No. of machines involved in variation
CR *	--	---
ER *	--	---
ECoR	-1 to 16	19 machines = [BCM (1), CSM (1), DUO (4), UNI (3), MPT (1), FRM (1), PBR (3), DGS (3), UTV (1) and T28 (1)]
ECR	8 to 60	17machines={DUO(7),VPR(2),TXP(1),UNI(4),CSM (3)}
NCR ^	--	---
NER*	---	--
NFR	-1 to 1	3 machines= {UNI(1),PQRS(2)}
NR	-100 to 22	59 machines= [3X(1),BCM(7),BRM(4),CSM(6),DTS(7),FRM(3),MPT(1),PQRS(4),RGM(1),T-28(2),TRT(2),UNI(7),WST(14)]
NWR	-70 to 56	9 machines = [BRM (1), DTS (2), PQRS (1), UNI (2), UTV (2) and VPR (1)]
SCR	-3 to 2	10 machines = [DUO (5), UNI (3), DGS (1) and T28 (1)]
SECR	-18 to 203	29 machines = [CSM (2), DUO (4), BCM (3), BRM (1), UNI (4), DGS (6), T28 (1), UTV (6) and MPT (2)]
SER	-74 to 4692	37 machines = [CSM (3), DUO (6), UNI (5), MPT (1), T28 (3), DGS (6), PQRS (3), FRM (2), BCM (3) and BRM (5)]
SR *	--	---
SWR	-40 to 148	18 machines = [CSM (2), DUO (2), MPT (3), UNI (1), T28 (1), BCM (4), FRM (1), DGS (2) and PQRS (2)]
WCR *	--	---
WR	-41 to 88	52machines={3X(1),CSM(4),DUO(7),UNI(7),BCM(7),PQRS(2),BRM(3),DTS(9),T-28(4),SBCM(1),UTV(7)}

\*TMS is not implemented fully across the divisions of these Five ZRs (NER, CR, SR, ER and WCR). Hence, comparison of data between TMS and TMO could not be made.

^ Data maintained by Control Office is adopted by both TMS and TMO (NCR). Hence, no difference in reporting.

## Appendix- J-1 [Para 2.6.8 (i)]

Table showing variation in consumption of HSD Oil by same machines in two consecutive years

Sl. No.	Zonal Railways	No. of machines having excess consumption of HSD Oil beyond the allowance of 15 per cent during the year			
		2011-12		2012-13	
		No.	Range in per cent	No.	Range in per cent
1	CR	11	19 to 229	13	19 to 81
2	ECoR	6	60 to 215	0	0
3	ECR	19 (2010-11)	16 to 373	9 (2011-12)	17 to 264
4	ER	4	105 to 810	0	0
5	NCR	14	18 to 280	12	17 to 307
6	NER	5	21 to 135	8	21 to 78
7	NFR	9	20 to 602	13	24 to 190
8	NR	13	17 to 148	11	17 to 52
9	NWR	7	17 to 135	4	23 to 83
10	SCR	9	21 to 585	9	18 to 71
11	SECR	4	19 to 41	8	21 to 148
12	SER	9	18 to 2379	10	16 to 244
13	SR	3	18 to 912	0	0
14	SWR	3	37 to 939	6	16 to 145
15	WCR	11	26 to 127	10	18 to 247
16	WR	7	18 to 43	17	15 to 438



**Appendix-J-2 [Para 2.6.8 (ii)]****Table showing variation in consumption of HSD Oil by similar machines across zones in the year 2012-13**

Sl. No.	Zonal Railways	No. of machines involved in excess consumption	Range of excess consumption even after allowing 25% allowance for different site conditions
1	CR	11	26 to 91
2	ECR	6	27 to 127
3	ER	1	33
4	NCR	8	36 to 132
5	NFR	5	48 to 240
6	NR	10	29 to 116
7	NWR	1	48
8	SER	5	29 to 91
9	SR	1	36
10	SWR	5	32 to 145
11	WCR	4	32 to 294
12	WR	3	26 to 62

## Appendix- K (Para 2.6.9)

Table showing the Zonal Railway-wise position of short realisation of credit

Sl	Zonal Railway	Years in which short realization existed	Amount (₹in crore)	Remarks
1	CR	2011-12; 2012-13	9.05	Figures of other years not available
2	ECoR	2010-11; 2011-12; 2013-14	Nil	Figures of 2009-10 not available
3	ECR	2009-10; 2010-11; 2011-12	99.18	Figures of other years not available
4	ER	2010-11	0.17	Figures of others years not available
5	NCR	2009-10 to 2013-14	1.11	-
6	NER	---	0	Figures of 2011-12 to 2013-14 Not Available
7	NFR	2010-11	0.13	Short realisation for 2010-11 only
8	NR	2012-13 to 2013-14	21.15	Figures of other years Not available
9	NWR	2012-13	1.10	Figures of other years not available
10	SCR	2009-10 to 2013-14	4.58	-
11	SECR	2011-12 to 2012-13	0.15	Figures of 2009-10 not available
12	SER	2010-11,2012-13	2.21	
13	SR	2009-10 to 2011-12 and 2013-14	25.40	
14	SWR	2010-11, 2012-13	10.11	Figures of 2013-14 Not Available
15	WCR	2009-10 to 2013-14	0	No credit realised
16	WR	2010-11 to 2011-12	1.55	
		Total	175.89	